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ABSTRACT

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(A.)

DEVELOPMENT OF THE CONSOLIDATED NAVIGATION SYSTEM

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DEFENSE MAPPING AGENCY

ABSTRACT

The Defense Mapping Agency ~~(DMA)~~ recently has taken a major step into a 'paperless' production process. Notice to Mariners corrections are no longer printed on a card, passed along for review and evaluation, and batch loaded into the computer. Terminal input and soft copy screen edit allow for maximum flexibility, clarity, and consistency.

INTRODUCTION

The United States has been producing marine safety information manually on paper for well over 100 years. The internal procedure consisted of a notice to mariner compiler writing a chart or light correction on a formatted card. This went to a checker for a second evaluation. The correction then went to a section chief for further review before it went to an editor who looked for format and consistency for the entire Notice to Mariners document. Due to the many cards processed and the several reviews in procedure, time spent to control the physical flow of paper added to processing time.

With the arrival of computer technology, and in particular, personal computers, it became clear there was a more efficient way of producing these corrections. The Automated Notice to Mariners System (ANMS) already existed and resulted from the correction card process described above. ~~(Figure 1).~~ It is only natural that the front-end procedure follow with automation as well; hence, the Consolidated Navigation System (CNS) came to life. (KR)

DEVELOPMENT AND PRODUCTION PROCESS

Before 1980, no phase of compilation of the DMA Notice to Mariners benefitted from automation. The DMA Navigation Information Network (NAVINFONET) did not exist and information moved completely through a paper setting before printing (S.C. Hall, 1989).

The idea to automate production required a complete data base of charts and corrections. Up until 1974, DMA's corrections appeared in a narrative format. The body of the corrections, laid out in sentence form, had all chart coverage listed at the bottom of the paragraph. From 1974 to 1980, the loading of individual chart corrections continued for completion of the data base. This type of data base allowed easy

tracking by chart number. Notice to Mariners Number 31 of 1980 was the first notice produced from the ANMS files. Now, a magnetic tape generated from the ANMS is sent to the DMA Graphic Arts Department for page negatives. The Government Printing Office receives the page negatives, then prints and distributes the finished product.

All through the 1980s, new files added to ANMS made the system more comprehensive so it could support a variety of users. Broadcast warnings, list of lights, mobile offshore drilling units, and others were added to the available files. DMA's goal was, and still is, to provide a system that allows easy access to external users via telephone or satellite links. This external access capability is known as the Navigation Information Network. Ships at sea, notice to mariners compilers, and cartographers can all benefit from NAVINFONET. Through NAVINFONET, requests for data are handled quickly with little human intervention through a series of computer prompts.

Before CNS, the ANMS data files were readily available to system managers, but not so for the marine information compilers. They had to use one of two dumb terminals with a phone hookup to access data files. This was a slow and tedious method, with no flexibility to input new data. CNS removes these shortcomings. It allows MISs immediate access to all data files and the ability to input corrections directly (no clerical input of cards) providing an efficient production flow.

A time study was conducted to see how long it took for a card to go from a writer all the way through editing. The estimation was a 20 minute savings per correction when the process changed from manual to automated. Based on this and the need for the compilers to have ready access to all the ANMS data files, the justification for CNS passed. Now compilers have direct access to files that assist them in their compilation efforts and that help in the decision making process.

The idea to automate was basically a simple one. Commercially available terminals and custom designed software work together through a Local Area Network. Along with upgraded ANMS Central Processing Units, CNS is flexible, efficient, and adaptable (Figure 2). Even in this early stage (CNS commenced production April 1990), it proves itself in time savings of 20 minutes per correction.

Additionally, due to enhancements, new menu items are providing the compilers greater range of capabilities. For instance, in the area of quality control, the Chart Reference File (CRF) is a program in the CNS that checks for gross positional errors. It enables the editors to run each chart correction through a routine to determine whether the position falls within the limits of the chart (the CRF has parameters on some 4000 DMA and 1000 National Ocean Service charts). Thus, CNS is also a quality control tool. Using the CRF, positional errors in the notice can be found internally before publication.

Another drawing card of the CRF is its alternate use as a method to determine all applicable charts for any given correction. Simply by inserting a geographical position, the compiler can receive a listing of charts with coverage of the correction. The listing contains other important information such as the scale, series, and edition number of a chart. A geographical display of the orientation of the charts effected is also an option.

Now, both light and chart correctional data can be input into CNS. A compiler inserts the data on a screen template, formats, stores, and passes it on for publication. Soon, Sailing Directions, Coast Pilots, radiobeacons, and catalog corrections, as well as Broadcast Warnings, will be input in the same manner. Having all of the ANMS data files at the compilers' fingertips aids them in their research and composition of Notice to Mariners corrections. Also, the ANMS data files provide ancillary information used in decision making.

Thus far, CNS has proven to be a rapid and efficient tool in developing marine safety information for publication. Soft copy flow of information from the writer through the editor is very smooth. No longer is there a conflict in deciphering individual writing styles. The need to control the physical flow of the cards along the process and the requirement to batch load the cards no longer exists. Soft copy screens offer maximum standardization and clarity. With the savings in time experienced already and the expected savings from full implementation of CNS, several work years of effort will be realized.

FUTURE OUTLOOK

Much study, discussion, and progress continue in the electronic charting and updating fields - the new generation of providing and using marine safety information. Hydrographic offices, including the Defense Mapping Agency, engage in working groups and subcommittees. All anxiously await finished standards of operation and means to keep electronic charting systems current. CNS, along with NAVINFONET, are DMA's steps in the direction of a total digital medium for producing and providing this information electronically.

Reference

Hall, S.C. (1989): The Defense Mapping Agency's Navigation Information Network. The International Hydrographic Review, Vol. LXVI(1), January.

THE *AUTOMATED* NOTICE TO MARINERS SYSTEM

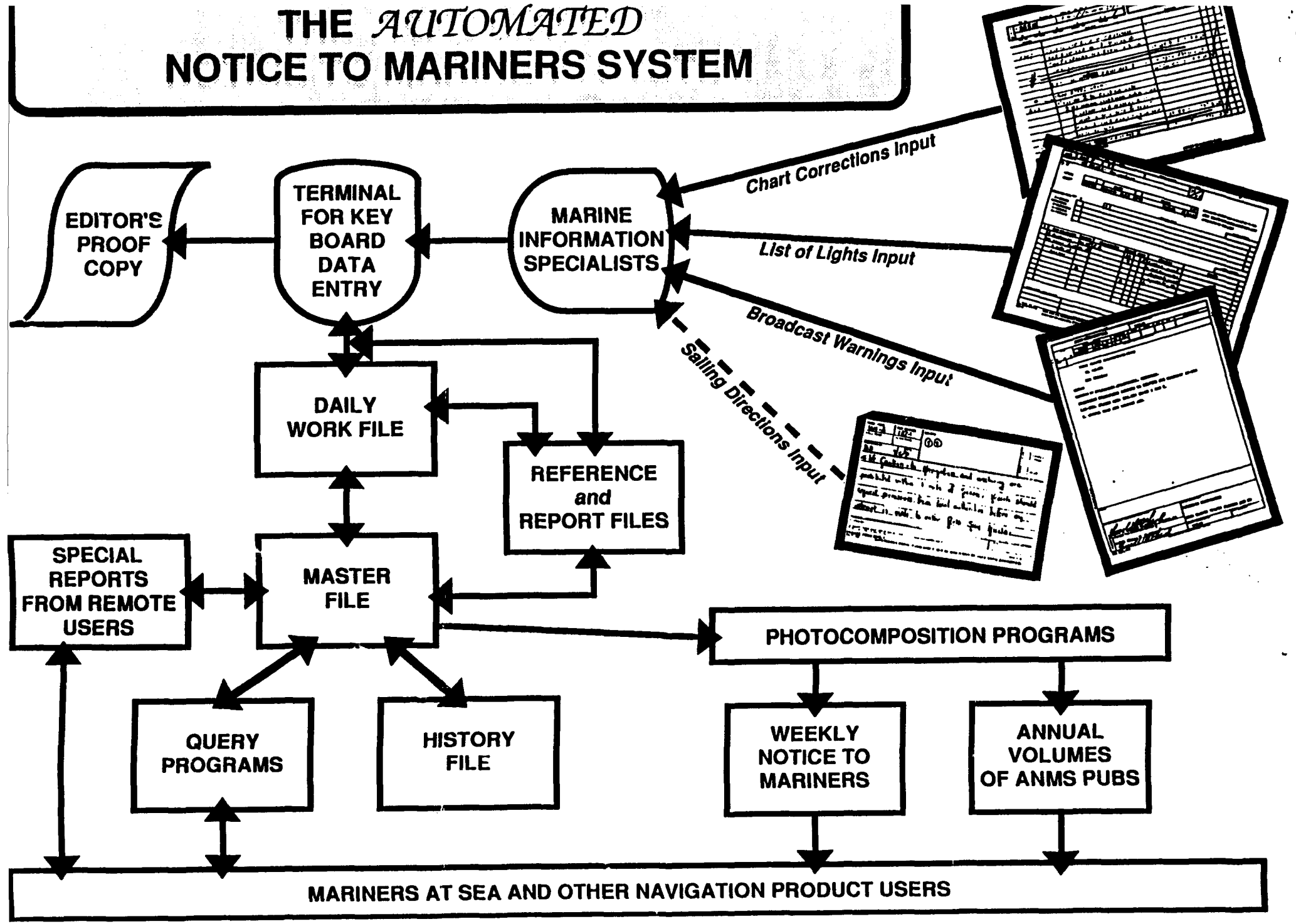

Figure 1

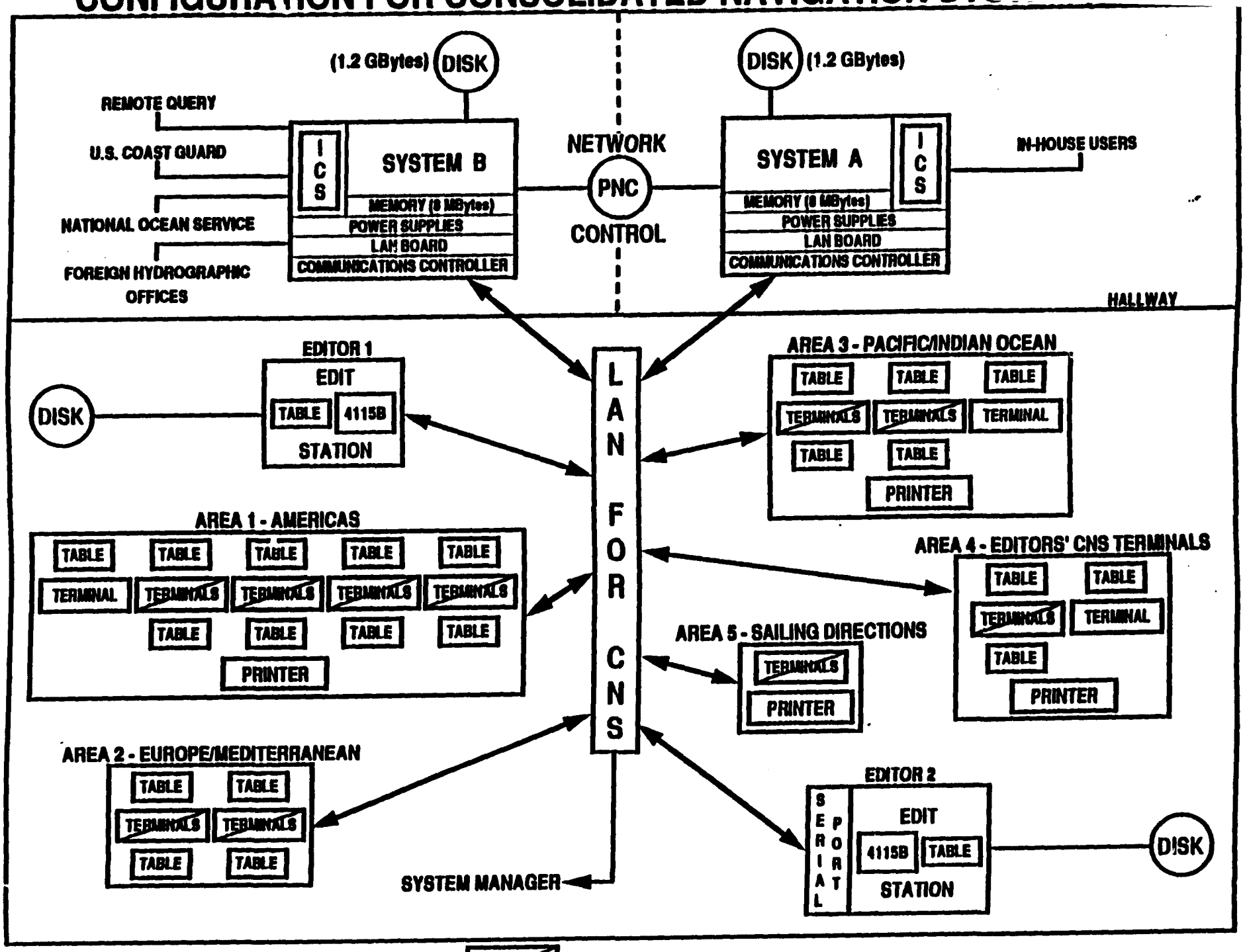
CONFIGURATION FOR CONSOLIDATED
(1.2 GBytes)
DISK
DISK
(1.2 GBytes)
REMOTE QUERY
U.S. COAST GUARD
NATIONAL OCEAN SERVICE
FOREIGN HYDROGRAPHIC OFFICES
ICS
SYSTEM B
MEMORY (8 MBytes)
POWER SUPPLIES
LAN BOARD
COMMUNICATIONS CONTROLLER
NETWORK
PNC
CONTROL
SYSTEM A
ICS
MEMORY (8 MBytes)
POWER SUPPLIES
LAN BOARD
COMMUNICATIONS CONTROLLER
IN-HOUSE USERS
HALLWAY
EDITOR 1
EDIT
TABLE
4115B
STATION
DISK
LAN FOR CNS
AREA 3 - PACIFIC/INDIAN OCEAN
TABLE
TABLE
TABLE
TERMINALS
TERMINALS
TERMINAL
TABLE
TABLE
PRINTER
AREA 1 - AMERICAS
TABLE
TABLE
TABLE
TABLE
TABLE
TERMINAL
TERMINALS
TERMINALS
TERMINALS
TERMINALS
TABLE
TABLE
TABLE
TABLE
PRINTER
AREA 4 - EDITORS' CNS TERMINALS
TABLE
TABLE
TERMINALS
TERMINAL
TABLE
PRINTER
AREA 5 - SAILING DIRECTIONS
TERMINALS
PRINTER
AREA 2 - EUROPE/MEDITERRANEAN
TABLE
TABLE
TERMINALS
TERMINALS
TABLE
TABLE
SYSTEM MANAGER
EDITOR 2
SERIAL PORT
EDIT
4115B
TABLE
STATION
DISK
TERMINALS – INDICATES TWO TERMINALS

Figure 2